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(54) Support unit for resiliently supporting a rotating shaft

(57) A support unit for resiliently supporting a rotating shaft, comprises a revolving bearing (1) constituted at least by an inner ring (2) and an outer ring (3) and at least one row of revolving bodies (4) disposed

therebetween, and an annular element (7) constituted by a very deformable resilient material e.g. rubber. The outer surface (9) of said outer ring (3) of said bearing is directly engaged with the inner surface of said annular element (7), and said engaged surfaces are fixed securely together e.g. by vulcanisation and adhesive.

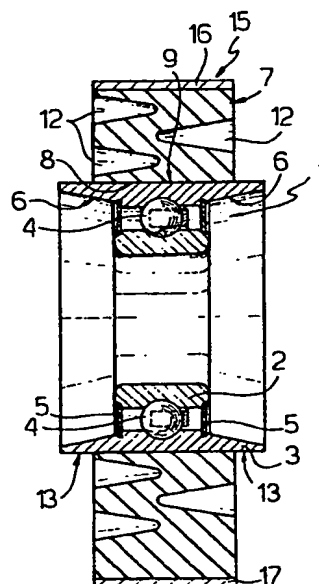


Fig.1

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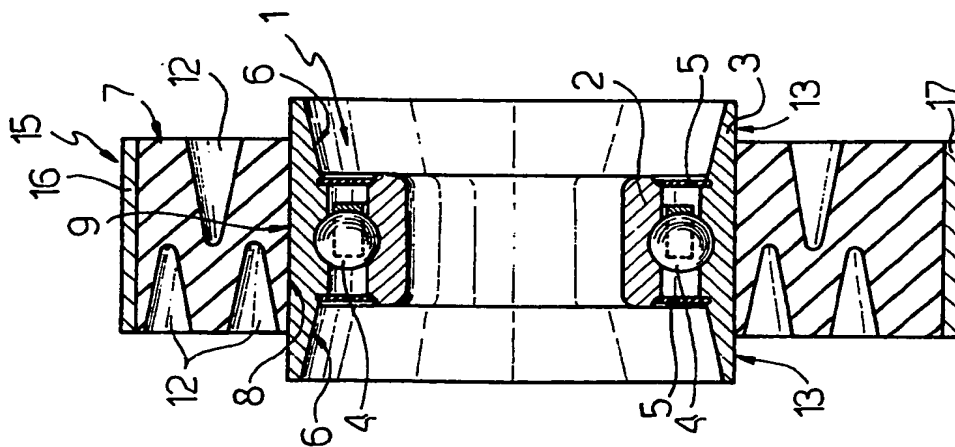


Fig.1

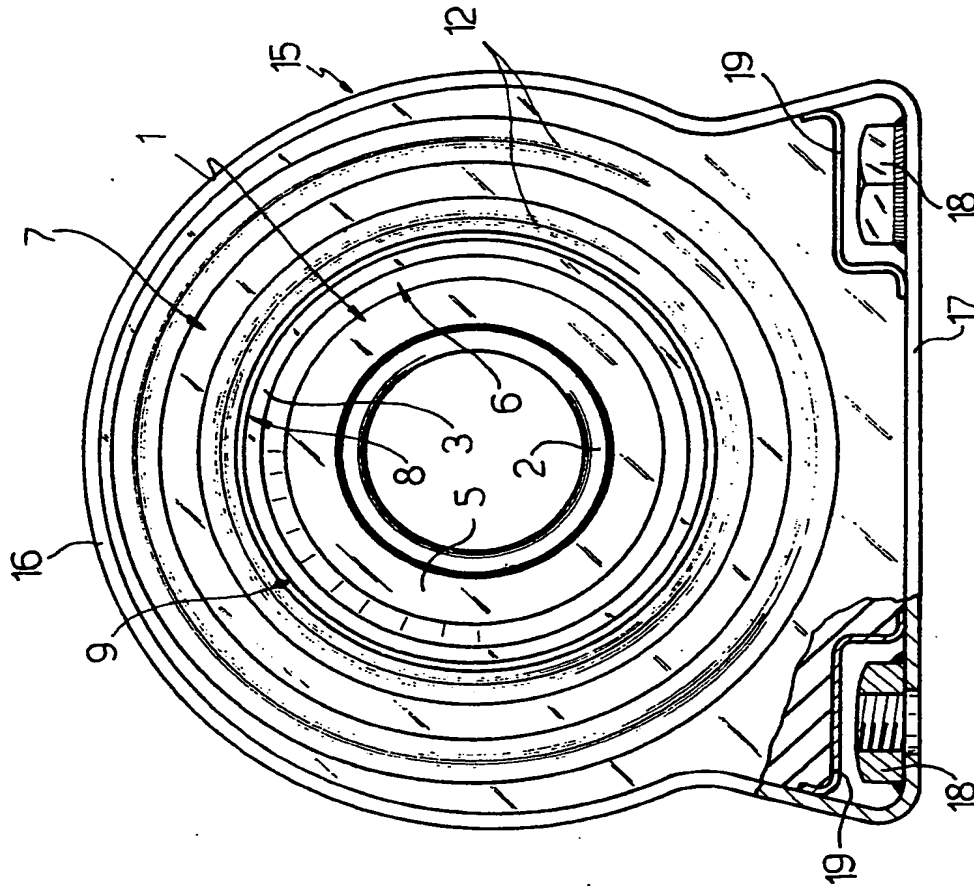


Fig.2

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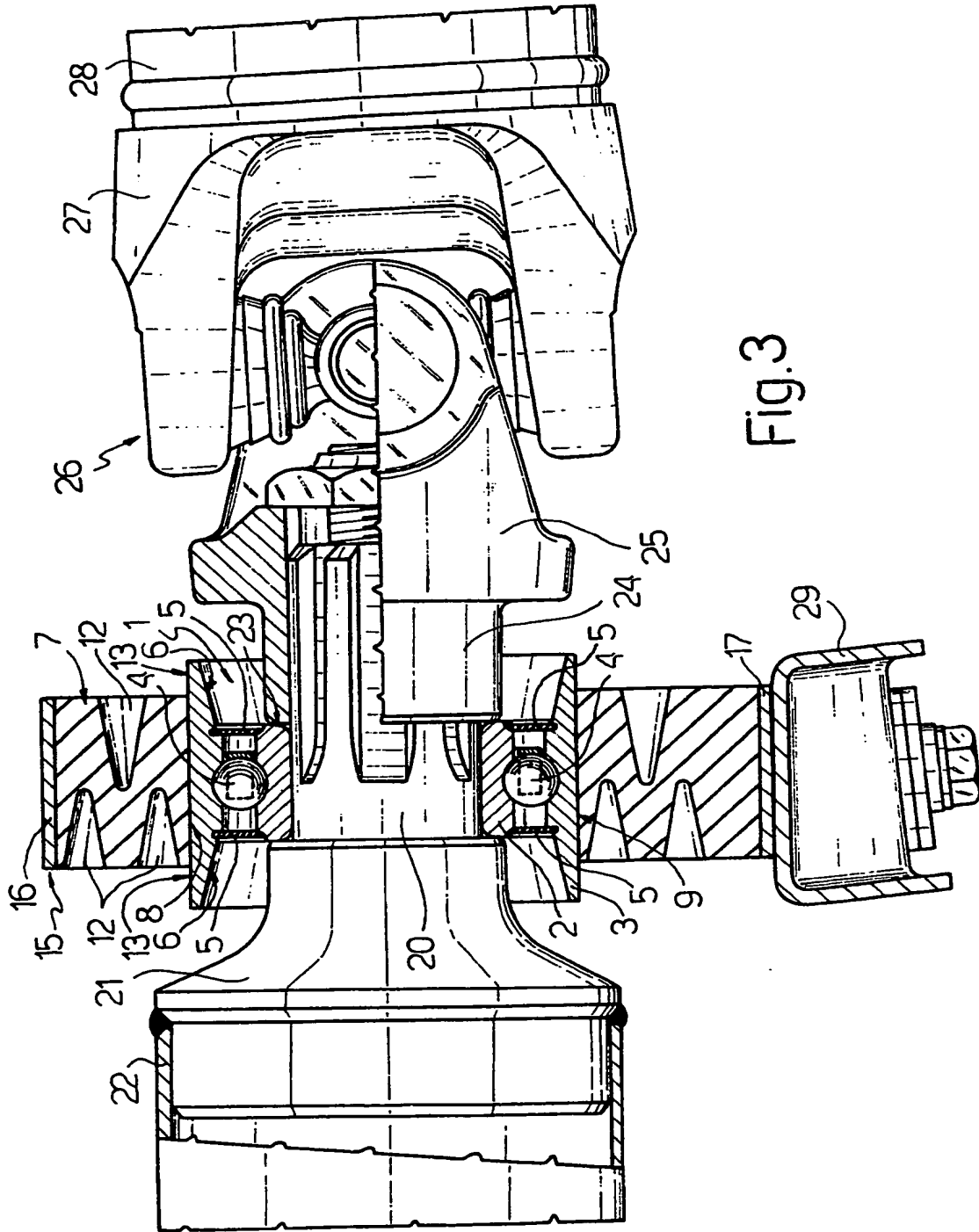


Fig. 3

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SPECIFICATION

Support unit for resiliently supporting a rotating shaft

5 This invention relates to a support unit which can be used in a transmission, in particular of automobile type, for resiliently supporting a rotating shaft.

The structures usually devised for resiliently supporting a rotating shaft comprise at least one revolving bearing locked on to a portion of the shaft, a bush in which a seat and suitable shoulders are provided for the outer ring of the bearing, and an annular element constructed of a very deformable resilient material arranged to resiliently support the bush from a frame. For this purpose, the bush is keyed into the bore of said annular element, and this latter is housed in an annular support member provided with suitable fixing means.

20 The described structure has certain drawbacks.

The mechanical unit resulting from this structure comprises numerous component parts, on some of which very precise machining operations have to be carried out, and a number of operations are required in assembling said parts.

25 In this respect, the said bush comprises a seat and shoulder for the outer bearing ring, and usually a seat for housing a split ring which constitutes the other shoulder for the bearing ring, these requiring mechanical machining operations of rather narrow tolerances. In addition, a number of operations which have to be carried out with particular care are required in assembling the bearing inside the bush.

35 The object of the present invention is to provide a support unit for resiliently supporting a rotating shaft which is free from the drawbacks of the units of the type heretofore described.

40 A further object of the present invention is to provide a support unit of the type indicated which is very compact and of small overall size.

The present invention provides a support unit for resiliently supporting a rotating shaft, comprising a revolving bearing constituted at least by an inner ring and an outer ring and at least one row of revolving bodies disposed therebetween, and an annular element constituted by a very deformable resilient material, characterised in that the outer surface of said outer ring of said bearing is directly engaged with the inner surface of said annular element, said engaged surfaces being fixed securely together.

50 If said annular element is constructed of rubber or another elastomer material, it is vulcanised directly on the outer surface of said outer ring of the revolving bearing.

The present invention will be more apparent from the description given hereinafter of one embodiment thereof with reference to the accompanying drawings in which:

60 Figure 1 is an axial section through the support unit of the invention;

Figure 2 is a side view thereof;

Figure 3 shows one example of application of

65 said unit for supporting the ends of two half shafts in a motor vehicle transmission.

The support unit of the invention, shown in Figure 1, comprises a revolving bearing 1 constituted by an inner ring 2 and an outer ring 3, and a row of revolving bodies 4. Even though in the embodiment illustrated the bearing is of the type comprising one row of balls, it is apparent that it can have one or more rows of revolving bodies of any type. Conveniently, said bearing is provided with seal elements 5 arranged to prevent both the escape of lubricant from the compartment between the rings and the entry of foreign substances into said compartment.

80 As can be seen in Figure 1, the outer ring 3 has an axial width which is much greater than that of the inner ring, and its inner surface conveniently comprises two conical surface portions 6 normally disposed symmetrically about the rolling track.

The unit according to the invention also comprises an annular element 7 constructed of a very deformable resilient material such as a rubber or elastomer. The inner cylindrical surface 8 of said element directly engages with the outer cylindrical surface 9 of the outer ring 3, and these engaging surfaces are securely fixed together.

90 Said fixing is carried out in any convenient manner. If the material of the annular element 7 is a vulcanisable material (rubber or elastomer), said annular element can be vulcanised directly on the outer ring 3 of the bearing. Otherwise, fixing can be carried out by applying a suitable adhesive between the engaged surfaces 8 and 9, or providing them with a surface finish so as to obtain the connection. This can possibly be improved by radial forcing pressure, provided by mounting the outer ring 3 on the annular element 7 with a predetermined interference, should the material of the latter be sufficiently rigid to be able to generate said pressure by this method.

105 As shown in Figure 1, the annular element is conveniently provided with annular grooves 12 to make it more deformable.

Even though the axial width of said element can be chosen at will, it is conveniently less than that of the outer ring 3 in order that on this latter there is left free a pair of cylindrical surface portions 13 to enable suitable members of balancing devices to rest thereon, these balancing devices being used to balance the various parts of the transmission in which the unit according to the invention is mounted.

115 The unit also comprises a housing for the annular element 7, which in the embodiment shown is constituted by a preferably metal endless band 15 which peripherally wraps the element. Said band comprises a first part 16 of circumferential arc configuration, and a second substantially flat part 17 which forms a support for the unit when it is mounted on a suitable part of a frame. This flat part is conveniently provided with connection means which, in the embodiment illustrated, are in the form of nuts 18 fixed to said part, so that a threaded shank can be screwed into their threaded bore.

The annular element 7 can be configured as shown in the side view of Figure 2, so as to completely fill the cavity within the band 15 and thus be substantially in contact with the entire inner surface of the band. In this case, to prevent the material of the annular element 7 filling the bores in the nuts 18, a protection element 19 can be disposed on top of each of them.

The annular element 7 can be fixed to the band 15 by any convenient method, for example by vulcanisation, gluing, forcing or the like, in particular by using the same method followed in fixing the annular element 7 to the outer ring 3 of the bearing 1. The housing for the annular element 7 can be of different shape to that illustrated and described, and can comprise for example simply a ring provided with connection feet.

Figure 3 shows one example of application of the support unit, which is here used for supporting the ends of two half shafts of an automobile transmission between which a coupling is disposed. As can be seen in Figure 3, the inner ring 2 of the bearing of the unit according to the invention is keyed on to a cylindrical portion 20 of an end element 21 of a first half shaft 22. This ring is locked between a shoulder 23 of said end element and a sleeve 24 rigid with an element 25 of a coupling 26, and provided with axial grooves for engaging with corresponding axial projections on the cylindrical end portion 20. The other element of the coupling 27 is connected to the second half shaft 28.

The band part 17 is fixed to a cross-member of the vehicle chassis.

It is therefore apparent that the described support unit is constituted by just a few parts and is therefore simple, of small overall size and very compact. Moreover, assembly operations are not necessary for its construction (with the exception of those connected with the manufacture of the revolving bearing 1), as its basic constituent parts (bearing 1, annular element 7 and band 15) can be connected together during the forming of one of them (annular element 7).

It is apparent that modifications can be made to the various parts of the described embodiment of

the present invention, without leaving the scope of the inventive idea.

CLAIMS

1. A support unit for resiliently supporting a rotating shaft, comprising a revolving bearing constituted at least by an inner ring and an outer ring and at least one row of revolving bodies disposed therebetween, and an annular element constituted by a very deformable resilient material, characterised in that the outer surface of said outer ring of said bearing is directly engaged with the inner surface of said annular element, said engaged surfaces being fixed securely together.

2. A support unit as claimed in claim 1 in which said annular element is constructed of rubber or an elastomer, characterised in that said annular element is vulcanised directly on the outer surface of said outer ring of the revolving bearing.

3. A support unit as claimed in claim 1 or 2, characterised in that the axial width of said outer ring of the revolving bearing is greater than that of the inner ring of the bearing.

4. A support unit as claimed in claim 3, characterised in that the inner surface of said outer ring comprises two conical surface portions disposed symmetrically about the rolling track of the ring.

5. A support unit is claimed in one of the preceding claims, characterised by comprising a housing for said annular element which is arranged to fix the unit on to a frame.

6. A support unit as claimed in claim 5, characterised in that said annular element is vulcanised directly on the inner surface of said housing.

7. A support unit as claimed in any of the preceding claims, characterised in that the axial width of said annular element is less than the axial width of said outer ring of the bearing, so as to leave two lateral surface portions of the ring free symmetrically about said annular element.

8. A support unit for resiliently supporting a rotating shaft, substantially as described and illustrated in the accompanying drawings.